REMARKS

Claims 1-60 are pending in the present application. Claims 1-56 are rejected. Claims 57-60 are subject to restriction.

Election/Restriction

The Examiner states that additional claims 57-60 are directed to an independent invention, because they add the limitation "creating a buyer's specification of at least one market protocol," which was not presented in the original set of claims. Applicants traverse the restriction. In claim 1, we describe: (a) creating a buyer's abstract representation of at least one attribute of a request, and the relationship between at least one utility of the request and at least one state of the at least one attribute;

The limitation of "specification of at least one market protocol" is a special version of an abstract representation of a request, in which the market mechanism is the attribute of interest. Thus, since the new claims should be considered and examined together with claims 1-56. No additional searching in a separate class should be necessary. Therefore, applicant respectfully requests that the restriction be withdrawn.

Rejection under 35 U.S.C. §112

The examiner mentions that the word "ontology" in claim 18 is used by the claim to mean "meta-data," while the accepted meaning is not defined in any computer dictionary. And the term is indefinite because the specification does not define the term.

In our remarks, we described an ontology as "a special kind of meta-data repository that describes the conceptualization of a domain." There are numerous examples of the use of ontology which is a common term used in the art. For example: The World Wide Web consortium [http://www.w3.org/TR/webont-req/#onto-def] describes an ontology as follows: "An ontology **defines the terms used to describe and represent an area of knowledge**. Ontologies are used by people, databases, and applications that need to share domain information (a domain is just a specific subject area or area of knowledge, like medicine, tool manufacturing,

real estate, automobile repair, financial management, etc.). **Ontologies include computer-usable definitions of basic concepts in the domain and the relationships among them.**

A recent wikipedia article [http://en.wikipedia.org/wiki/Ontology_%28computer_science%29] states:

> "In both computer science and information science, an **ontology** is a **data model** that **represents a set of concepts within a domain and the relationships between those concepts**. It is used to reason about the objects within that domain.
>
> Ontologies are used in artificial intelligence, the semantic web, software engineering and information architecture as a form of knowledge representation about the world or some part of it."

The "Free On-line Dictionary of Computing" < http://foldoc.org >, refers to an Ontology as:

> "2. <artificial intelligence> (From philosophy) An explicit formal specification of how to represent the objects, concepts and other entities that are assumed to exist in some area of interest and the relationships that hold among them.

A set of agents that share the same ontology will be able to communicate about a domain of discourse without necessarily operating on a globally shared theory. We say that an agent commits to an ontology if its observable actions are consistent with the definitions in the ontology. The idea of ontological commitment is based on the Knowledge-Level perspective. "

The Stottler Henke Artificial Intelligence Glossary < http://www.stottlerhenke.com/ai_general/glossary.htm > defines an ontology as:

> A formal ontology is a rigorous specification of a set of specialized vocabulary terms and their relationships sufficient to describe and reason about the range of situations of interest in some domain.
>
> In other words, it is **a conceptual representation of the entities, events, and their relationships that compose a specific domain**. Two primary relationships of interest are abstraction ("a cat is specific instance of a more general entity called animal") and

composition ("a cat has whiskers and claws"). **Ontologies are generally used to model a domain of interest, permitting inferential and deductive reasoning by learning systems**.

Therefore, our use of the term "ontology" is consistent with standard current usage of the term. In particular, for our usage, an ontology provides more than merely a data description, it provides a conceptualization that permits computers to reason about the data described by the ontology, and is especially important in providing interoperability among different databases or different descriptions of data. Therefore, the rejection should be withdrawn.

Rejection under 35 U.S.C. §103 (a)

The Examiner has rejected claims 1-6 and 28-33 under 35 U.S.C. §103(a) as being unpatentable over U.S. 6,584,451 to Shoham, et al. (Shoham '451) in view of U.S. 6,012,046 to Lupien, et al., (Lupien '046). The Examiner has rejected claims 7-13, 16, 18, 22-27, 34-40, 43, 45 and 49-56 under 35 U.S.C. §103(a) as being unpatentable over Shoham '451 and Lupien '046 in view of U.S. 6,141,653 to Conklin, et al., (Conklin '653). Finally, the Examiner has rejected claims 14-15, 17, 41-42 and 44 under 35 U.S.C. §103(a) as being unpatentable over Shoham '451, Lupien '046 and Conklin '653 in view of U.S 6,236,977 to Verba, et al., (Verba '977). Applicants respectfully traverse these rejections.

Applicants presented arguments in the prior response and hereby incorporate those arguments in their entirety. Applicants present additional arguments in response to the Examiner's "Response to Arguments" beginning on Page 14 of the present outstanding Office Action.

On Page 16 of the Office Action, the examiner states that Shoham does not describe a system for representing arbitrary attributes of an offer, or for relating the price of the offer to such attributes, are not recited in the presently rejected claims. Applicants respectfully disagree.

For convenience and comparison, applicants break down the elements of claim 1 and provide commentary illustrating the presence of the limitations in question.

In Claim 1 of the present invention, we claim:

Claim	Commentary
A method for automatically finding the best matches between buyers' requests and sellers' offerings in a market, for communicating those matches, and for executing commitments based on those matches, said method comprising:	In the preamble we state that the system finds best matches and executes commitments, based on those matches. Note that there is no limitation that requires that every match leads to a commitment – however, it is the *possibility* of a commitment makes the system valuable and attractive to both buyers and sellers.
(a) creating a buyer's abstract representation of at least one attribute of a request, and the relationship between at least one utility of the request and at least one state of the at least one attribute;	The buyer's abstract representation of attributes, the utility of the request, and states of those attribute is the mechanism that allows arbitrary attributes (not limited to financial attributes) to be considered. The buyer can state preferences about <u>any arbitrary</u> attribute of relevance, and about their preference for states of those attributes. Attributes can extend to features of the transaction as well as goods or services. Note that **the utility is typically represented as the price** the buyer would be willing pay for a particular state of attributes.
(b) creating a seller's abstract representation of at least one attribute of an offer, and the relationship between the total price of the offering and at least one state of the at least one attribute;	The seller's abstract representation relates the states of arbitrary attributes of an offer to the price of an offer. Again, any combination of arbitrary attributes can be priced.
(c) computing a rating for overall satisfaction of the at least one attribute of a request with respect to a given offer;	The system rates the total satisfaction with regard to all the attributes of the request and the offer.
(d) determining the quantity and identity of assignments of sellers' offerings to buyers' requests that produces the best set of matches for a given market; and	The system makes assignments that optimize the total value of the market matches.

(e) signaling that the quantities and identities of assignments are accepted and that the transaction is committed by buyers and sellers.	The system commits the assignments by signaling those assignments, as committed, to buyers and sellers.

Therefore, as described above, the limitations are in fact present in present claim 1 and Shoham should not be relied upon as a reference.

The examiner discusses the disclosure of Shoham '451 and states on page 15 of the Office Action that it is obvious to one of ordinary skill that any product/service has attributes, and that these attributes are included [in] a purchase specification which describes the utility and state of the attribute. For example, a designer of a circuit breaker must specify a part number from a catalog, or must specify the power (e.g. 360 KVA), size and type of connection so that the supplier knows what to sell. Automation of this manual process is not patentable. Applicants respectfully disagree.

The present invention automates more than the enumeration of attributes. It automates the consideration of the buyer's degree of satisfaction with states of those attributes, in terms of the amount the buyer is willing to pay for each state of each attribute with which he is concerned. For the present invention, a designer may be willing to spend $50 for an ideal ≥ 400 KVA) breaker, but only $40 for a 360 KVA breaker. He may also discount the amount if the warranty is shorter than 5 years, or if the part requires more than 1 week to ship. Using the invention, the user can express preference for any number of attributes, and any variety of states for those attributes, and can rely on the invention to make the best simultaneous match between his preferences and the universe of offerings, where the simultaneous match is also considering the prices and preferences of all other buyers in the same market, and the prices and preferences of all sellers in the market.

Additionally, the number of available circuit breakers may be larger than any user is willing to examine in sufficient detail – no user could "manually" consider a catalog of all of the states of all of the attributes of interest with a large number of offerings. This is clearly impossible for attributes with continuously variable values, such as the time of delivery, or the weight of a (custom-machined) mechanism. No catalog will list unique part numbers for every

conceivable warranty, delivery date, weight, thickness of plating, %Cu, %Ag, etc. Even if such a catalog existed, (perhaps online, generated "as-needed") it would be impossible for a human user to consider all relevant combinations.

Even for cases where the number of offerings is small enough for "manual consideration," the individual user cannot manually "determine the quantity and identity of assignments of sellers' offerings to buyers' requests that produces the best set of matches for a given market." This would require that the user know the preferences of all other users, and the attributes of all offerings, and can manually match them to create the market with the greatest total value. Users would not be able to solve such a problem manually, nor would they be inclined to mutually agree on the best assignments, if they were able to compute them. Therefore, Shoham does not teach, disclose or suggest the present invention and the rejection should be withdrawn.

The examiner states on Page 16 of the Office Action that the present claims do not include the features that applicants argue that Shoham lacks, such as a "committed protocol." Applicants respectfully disagree.

Applicants assert that the "committed protocol" is indeed present in the claims: For example, we claim:

A method for automatically finding the best matches between buyers' requests and sellers' offerings in a market, for communicating those matches, and for executing commitments based on those matches,

The commitment is further described in step (e):

(e) signaling that the quantities and identities of assignments are accepted and that the transaction is committed by buyers and sellers.

The submission of requests by buyers and offers by sellers, followed by optimal matching, followed by assignment, followed by signaling, constitutes a committed protocol.

The Applicants further maintain that it is important and limiting that the invention **can be** used for transactions using committed protocols, without limiting every interaction of buyers and sellers to use a committed protocol for that particular interaction. For example, buyers or sellers might enter into hypothetical transactions. For instance, a buyer might ask:

"what deals on alternators could I get in the current market if I made a request with the following attributes?" A seller might ask "how many alternators could I sell, and at what prices, if I offered alternators with the following attributes to the market?" In either case, the buyer or seller is not committed, but is "testing the waters." They will see only the requests and offers for which buyers and sellers (respectively) have allowed participation in uncommitted transactions (the decision to participate in such transactions is a choice of states of attributes in *their* termsheets and offersheets, respectively). Note **that the usefulness of these hypothetical transactions depends strongly on the possibility of (future) committed transactions**. There is no value in making hypothetical transactions in a market that could never offer execution of a transaction, as the results in such a market have no basis. Thus, the applicants assert that the invention as claimed is limited to markets in which a committed protocol is at least enabled. Therefore, the limitation is indeed present in the claims and distinguishes the present invention from the prior art. Thus, the rejection should be withdrawn.

The examiner states in the middle of page 16 of the Office Action in response to the applicant's argument (page 20 of the previous response) that the features upon which the applicant relies (i.e. "non-market" and "rank-order") are not recited in the rejected claims.

Applicant's argument made in the previous response (page 20) is that **Lupien** (FIG 8, 110, 112, Column 11, lines 1-16) **uses rank ordering** to order the satisfaction of buyer-seller pairs. The significance of this limitation of Lupien's invention is that it is not appropriate for use with any number of arbitrary attributes. For instance, consider rank ordering the buyer/seller combinations for alternators considering just 5 attributes: {Price, Quantity, Delivery-time, Amperage, and Warranty-length} assuming that price can range from 0 to $300.00 in $0.0001 increments (large quantities may include fractions of a cent) and that Quantity can range from 0 to 1000 by 1, and that Delivery Time can range from ½ day to 60 days, by half-days, and that Amperage can vary from 30 to 90 by 0.25 amp increments, and that warranty-length can vary from 0 months to 120 months, and that there are 1000 buyers and 50 sellers in the market place The number of combinations that must be considered and ordered is: 5.1408E+20. For Lupien's scheme to work, it would have to order far more combinations of choices than is feasible. For comparison, the largest reported transaction processing database (OLTP) database

in 2003 was only 18.3 TB of data, about 28,000,000 times too small to handle Lupien's approach.[i]

	Price	Quantity	Delivery	Amperage	Warranty	Buyers	Sellers
bot	0	0	0.5	30	0	0	0
top	300	1000	60	90	120	1000	50
inc	0.0001	1	0.5	0.25	1	1	1
Choices	3000000	1000	119	240	120	1000	50
Total Choices	5.1408E+20						

Thus Lupien's limitation of rank-ordering is profound, and prevents the Lupien from being a practical approach when an arbitrary number of attributes, with any number of states, are considered. Therefore, reliance on the Lupien reference as a primary or secondary reference is improper. Thus, the rejection should be withdrawn.

In response to the argument on page 20 of applicants previous response, the examiner states that providing optimization approach which maximizes sequentially the mutual satisfaction at each stage of the allocation process, by assigning allocations based upon the highest remaining mutual satisfaction value and where the approach has the virtue of being computationally tractable and generally yielding allocations with the tightest spreads in price (Lupien) [C12 L33 to C14 L55; C12 L33-L36; C13 L48 toC14 L8]."

The Applicants assert that the teaching ascribed to Lupien does not show motivation relevant to an arbitrary number of attributes, with any number of states. Lupien casts this problem as a sequential optimization problem and explicitly discusses the use of a **price/size value grid** [C 14, L6 – L26] construction of such a grid is intractable for markets considering an arbitrary number of attributes, with any number of states, for reasons given previously. That is, the approach intrinsically requires construction of a data structure that is 20,000,000 considerably larger than the largest online transaction processing databases. Even if there were sufficient disk memory to construct such a storage, searching it sequentially would take more time than is practical for usefulness in electronic markets.

Significantly, Lupien mentions in C15 L60 to L24 that the assignment problem can be cast as a global non-linear optimization problem, for which there are numerous alternative optimization approaches. In constructing his optimization model of the problem, Lupien **neglects to demonstrate how preference among any number of states of any number of attributes can be formulated**, nor does he disclose how global optimization can be made to work efficiently in such a case. Applicants assert that if it was Lupien's motivation to use optimization specifically to provide a practical approach to arbitrary multi-state/ arbitrary multi attribute markets, then the formulation presented would have provided a means to encode such cases as optimization problems. Lupien reinforces his exhaustive combination view of the problem again, in C16 L37–C17 L 24, where he demonstrates "**mutual satisfaction cross products**" as a table representing a contour plot. Again, such a table, and such a plot, is not tractable for arbitrary multi-state/ arbitrary multi attribute markets. Therefore, the Examiner's reliance on the cited references is misplaced and the combination of the references cannot be to shown to render the present invention obvious. Thus, the rejection should be withdrawn.

In the middle of page 17 of the Office Action, the Examiner states that, with respect to non-analogous art, prior art reference must be either in the field of the applicant's endeavor, or, if not, then be reasonably pertinent to the particular problem. In this case, matching of buyers and sellers bid and offer based on a satisfaction profile and matching the specification of the buyer and seller for a product or service are the same as financial transactions based on an auction.

The Applicants respectfully disagree that matching of buyers and sellers based on a satisfaction profile is the same as financial transactions based on an auction. One fundamental difference between market matching and establishment of markets through auctions is that matching can be accomplished in a single cycle (assuming one is able to perform an effective optimization step) while auctions require repeated cycles of offers and discovery of offers taken on the part of the buyer, seller, or both. Another important difference is that Matching (in the sense of the Applicant's invention) can usefully be applied to any number of attributes, with any number of states of preference, whereas this is impractical for purely auction-based approaches. (For instance, where does a buyer find the auction for 33-piece batches of 47.5 Amp alternators with 18 Month warrantees to be delivered in 6.5 days? How does the same buyer simultaneously

participate in that market along with the one that carries 35-piece batches of 46 Amp alternators? How does he view all similar auctions simultaneously, and make the choices that optimize his utility?) The Applicants maintain that these distinctions are fundamental and significant, and that they prevent obvious combination of satisfaction profiles with auction-type markets.

On Page 17 of the Office Action the Examiner states: In response to the argument that the references fail to show certain features of the invention, it is noted that the features upon which the applicant relies (i.e. "average price") are not recited in the claims.

Applicants point out that it is the Examiner's position that Lupien discloses "(c) the use of mathematical function approximation techniques for constructing market value functions that describe the relationships between prices and the states of attributes in a hypothetical market." The only references applicants could find in Lupien for such a construction are exemplified in Lupien's Summary of the Invention [C3 L64 – C4 L7] which states: "The present invention is directed to a computerized crossing network that allows traders to input as orders a satisfaction density profile and maximum size limit which at once characterizes the trader's degree of satisfaction to trade at any and all prices and sizes, up to the aggregate (or size) limit, and that matches orders (as represented by each trader's satisfaction density profile) so that **each trader is assured** that the overall outcome of the process (**in terms of average price and size of fill**) has **maximized the mutual satisfaction** of all traders."

Applicants maintain that this description from Lupien (and other, similar descriptions) does not disclose **applicants Claim 2 (c)** (bottom of page 26 of present application) "using of mathematical function approximation techniques for constructing market value functions that describe the representation of utility in arbitrary multi-state/ arbitrary multi attribute markets. Thus, reliance upon Lupien is improper and the rejection should be withdrawn.

At the bottom of page 17 and the beginning of Page 18, the Examiner states that "Secondary reference (Lupien) discloses what is not disclosed by the primary reference, which discloses an online buying/selling concept for goods and service, which are presented by procurement/specification. See primary reference(s) which discloses an online buying/selling concept for goods and service, which are presented by procurement/specification.

Applicants respectfully disagree and assert that the combination of the Primary references (Shoham and Conklin) do not disclose teachings, that when combined with Lupien, render the present invention obvious. As has been demonstrated previously, Lupien's **density profiles** are not equivalent to present claim 1. (a) "buyer's abstract representation of at least one attribute of a request, and the relationship between at least one utility of the request and at least one state of the at least one attribute", nor does Shoham's Online Buyer's Club System permit users to represent such utilities with respect to an arbitrary number of attributes and states, nor does Conklin's "System for interative, multivariate negotiations over a network" accomplish the step of 1. "(d) determining the quantity and identity of assignments of sellers' offerings to buyers' requests that produces the best set of matches for a given market."

Furthermore, applicants note that if one combined the art of Lupien and Conklin, and attempted to use such a combination for finding "the quantity and identity of assignments of sellers' offerings to buyers' requests that produces the best set of matches for a given market," then the solution would not be practical because, (as has been demonstrated above) Lupiens's approach requires an infeasible amount of storage when applied to an arbitrary number of attributes with an arbitrary number of states. Also, it is clear that Conklin's invention (Claim 1) relies on interactive negotiations by users to perform multivariate analysis, or (Claim 2) relies on one of the users as a "deciding entity." Though this iterative approach is reasonable for a small number of variables and a small market, the scale issues that render Lupien's invention infeasible for an arbitrary number of variables with an arbitrary number of states would also make Conklin's approach, alone or in concert with Lupien's, infeasible. For example, if Conklin's automated negotiation relied on Lupien's density profiles, then the system is infeasible from a computational aspect (as explained above). Additionally, if density profiles were somehow able to fit in memory for comparison sake, the "interactive user" of Conklin (claim 1) or "deciding entity" of Conklin (claim 2) would still have to evaluate an enormous number of alternatives because they have no means of expressing the utility of an arbitrary combination of states with all of the attributes of a good or service. Users, given Lupien and Conklin, must either provide (via mechanism of the Applicant's invention) a way of preference for any and all states of attributes, or they must review a combinatorially large number of alternatives. In light of these arguments, applicants assert that the rejection should be withdrawn.

Finally, the Examiner states on page 18 of the Office Action that the "[a]pplicant failed to disclose in the original specification "ontology" which is the applicant's defined work."

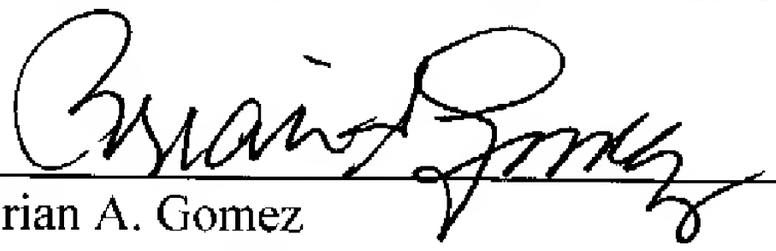
Though the term ontology is used without explicit definition in the application, the term is well known in the art of Artificial Intelligence, especially in Knowledge Representation. While it is true that an ontology, as it applies to the invention, provides a special kind of meta-data, the relations among concepts of an ontology have computational value beyond the value of typical object/attribute or entity/attribute relations found in (for instance) relational-database meta-data descriptions. The relevant aspect of ontologies is that they provide descriptions that **support interoperability based on conceptual equivalence**, rather than field identity. For instance, a buyer may request a part with a torque capacity expressed in foot-lbs, while a seller describes such a capacity in Newton-meters. As long as both buyer's dimensions and sellers dimensions make reference to a common ontology, the relations given in the ontology can be used to construct an equivalence (1.0 Foot –Pound = 1.3558179 Newton-meters). The conceptualization of physical dimensions in the ontology makes **inference of equivalence** possible, even when an explicit table of equivalence is lacking. For very complex products involving a mixture of dimensions, a simple table of equivalence would not typically exist for every equivalent set of dimensions. Consequently the Applicants assert that the rejection should be withdrawn.

The Examiner discusses prior art of record but not relied upon. Applicants have reviewed the references and agree that neither reference impacts on the patentability of the present invention.

CONCLUSION

Based on the Remarks above, Applicant respectfully requests allowance of all pending claims.

Respectfully submitted,
GOMEZ INTERNATIONAL PATENT OFFICE, LLC

Dated: 2-22-2007 By: 

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